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A REVIEW ON DESIGN AND DEVELOPMENT OF CHAIRLESS CHAIR BY USING DAMPER

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Abstract

It is very difficult to stand and work for overall shift in the company by a worker. This will reduce the efficiency of the worker. The solution to this problem is to have a portable device which has an ergonomic design, low cost exoskeletons. In this work a mechanical ergonomics device that is designed around the shape and function of the human body, with segments and joints corresponding to those of the person it is externally coupled with. It functions as a chair whenever it is needed and is coined as Chair less Chair. Worker in industrial can wear it on legs like an exoskeleton. It locks into place and you can sit down on it. The device never touches the ground, which makes it easier to wear: a belt secures it to the hips and it has straps that wrap around the thighs. These are specially designed and part of the mechanism, but an alternate version works with any footwear and touches the ground only when in a stationary position. The user just moves into the desired pose. It will fit closely to lower part of the body as an external body part on which maximum body forces act upon. It is a cost effective product and any error in design may fail the structure which creates loss. So, these forces should be carefully analyzed during the design of structure. The best way to predict these forces during pre-manufacturing stage is to make an analysis on the structure with the help of software. This helps in estimating the stresses induced on the structure which is one of the most important criteria for evaluation of the model

Keywords: The Exoskeleton; chair less chair; ergonomics.

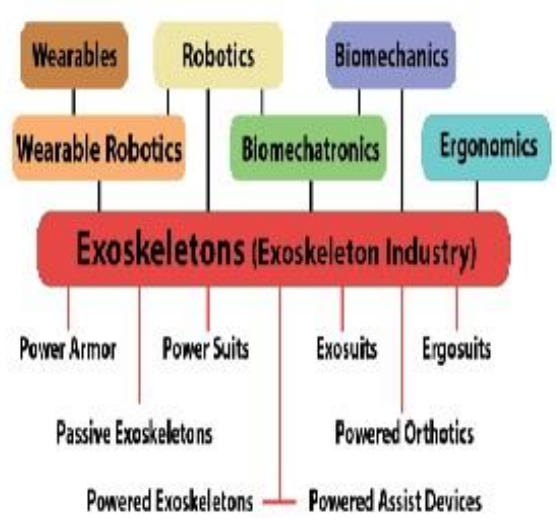
1. INTRODUCTION

Exoskeletons are defined as standalone anthropomorphic active mechanical devices that are "worn" by an operator and work in concert with the operators movements.Exoskeletons are mainly used to increase performance of able-bodied wearer. (e.g. for military applications), and to help disabled people to retrieve some motion abilities.(such exoskeletons are called "active orthoses" in the medical field). As we know, the normal motor capability of legs is crucial and important for human-beings daily life. Legs, however, are apt to be injured in accident. And the Rehabilitation is essential for the patients to recover after leg operation. Additionally, diseases, stoke for instance, can also result in the loss of leg function [1]. In order to regain the motor capability, the leg rehabilitation is a fundamental therapeutic approach. Basically Exoskeletons are of two types:

a) Active Exoskeletons
b) Passive Exoskeletons

Active exoskeletons: They are powered by external sources like a motor, battery powered etc. They work along with the passive exoskeletons to help in its functioning.

Passive exoskeletons: These are not powered by external power sources but work on the basis of mechanical linkages, pneumatic and hydraulic mechanisms, spring controlled devices etc. Since active exoskeletons pose a restriction to the amount of external energy that can be supplied in terms of quantity, quality and time we have focused purely on passive type of exoskeletons. Passive elements are implemented in the exoskeleton to either store or dissipate energy with the objective of reducing the residual energy that the human would have to expend for locomotion.



2.LITERATURE REVIEW

1. Cyril Varghese (2016)

Cyril Varghese and Vedaksha Joshi has worked on the Exoskeleton Based Hydraulic Support was successfully fabricated and it was found to be suitably safe [3]. Under fluctuating load during walking as well as under Dead Load when the user sits/rests on it.

2.H. Zurina ,A.fatin (2015)

H. Zurina and A. Fatinhas worked on the Design and Development of Lower Body Exoskeleton. In his paper an attempt has been made to evaluate the possibility of using the Chairless chair that will help in increasing the energy

efficiency and offer weight support when the user feels tired rather than continuously taking on the weight[2]. Other than that, in term of ergonomics, and the objectives to give comfort to user has achieved by give choices to user to choose their comfort degree level from 45° to 90°.Apart from the benefit of his experiment it can be conclude that his design still confront with some problems that need to fix in future so that the objective to give an ergonomic chair to user can be achieved. The experiment testing has been conducted for our prototype to our group member with weight of 80kg and height around 170cm. From the result of experiment testing, it can be observed that for height and weight, the Chair less chair doesn't give any effect in lack or over measure in its height dimension. It suit the user which prove that this chair can be wear by people from any height range. He tester were required to use the chair while do some work, it was observed that, he had difficulties in changing the degree level.

3. Aditya Bhalerao ,Sandesh Kambale (2016)

Aditya Bhalerao and Sandesh Kamblehave worked on Pneu portable chair for employees to seat while working. By referring to human seating and walking characteristic a leg mechanism has been conceived with as kinematic structure whose mechanical design can be used by employees as an wearable exoskeleton. As per the Specified Design parameters the body can suitably carry around the 100Kg of Human Body weight. In the later part to reduce the cost, Oil was also brought in the weight sustaining mechanism thus providing better results.

4. Y. Kalyan Chakravarthy, D.Tarun, A Srinath(2014) Estimation of body segment weights for prosthetic legs suitable to indian amputees.Approximate height & weight of indian people 5 ft 5inch to 6 ft& weight 100 kg.

3. CASE STUDY

1.problem identification:

In factories on production lines the workers work for about 8-10 hours daily. Generally production line is in standing position. Due to this workers get tired physically as well as mentally .Productivity of company gets decreased due to this. The workers face the problem like distress to their lower limbs and other physical problems. Technology has made tremendous development but there is technological gap between workers comfort and technology. So this is an attempt to make use of technology to make worker feel comfort at production line.

2.Design:

We have to design following main component:-

1.damper: The function of damper to carry the load of worker. We have designed it for 100 kg load.

2.sheet: Aluminium sheet required to give support to the worker and to fascinate the sitting position.

3.Tie belt : Belt is used for strapping of exoskeleton to human body. Belt will be taken as standard material available in market to wrap the model as waist and thighs.

4. Safety shoes: Shoes are the last of model which is attached at bottom place and to be wear at the time of working. Shoes are selected as standard size of number 9.

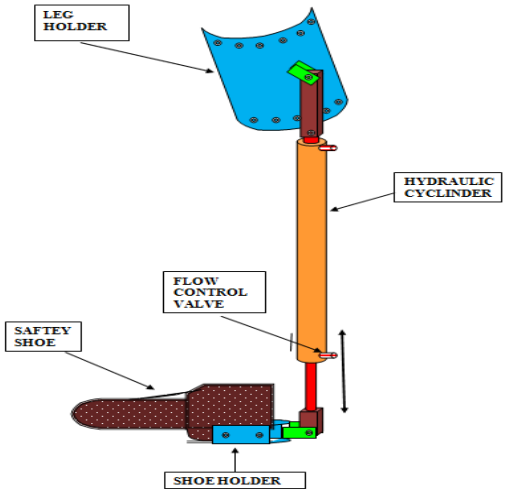


Figure 2: Schematic Diagram of Hydraulic Mechanism

Phase-3) Manufacturing and Developing of Experimental setup:-After designing we are going for the final manufacturing of chair less chair by modeled part model and
all the parts are then assembled

Phase-4):- Result and Discussion:-The specific weight and high for chair less chair is 5 ft to 5'5'' regular size and 100kg weight. Maximum deflection of loading condition is 0.2mm so it can be neglected.For the ultimate tensile strength of aluminum design can be considered as safe.

4. CONCLUSION

In this project design and fabrication of chairless chair has been done. The main goal of our projet was to give the comfort to workers, who work on production line for hours.

Also to make the model at least cost, that has been achieved. The work started with designing of model and procurement of required material. Finally fabricated Chairless Chair at workshop. The model is working satisfactorily. This concept was new and the data available was also limited. There are some future modification possible.

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